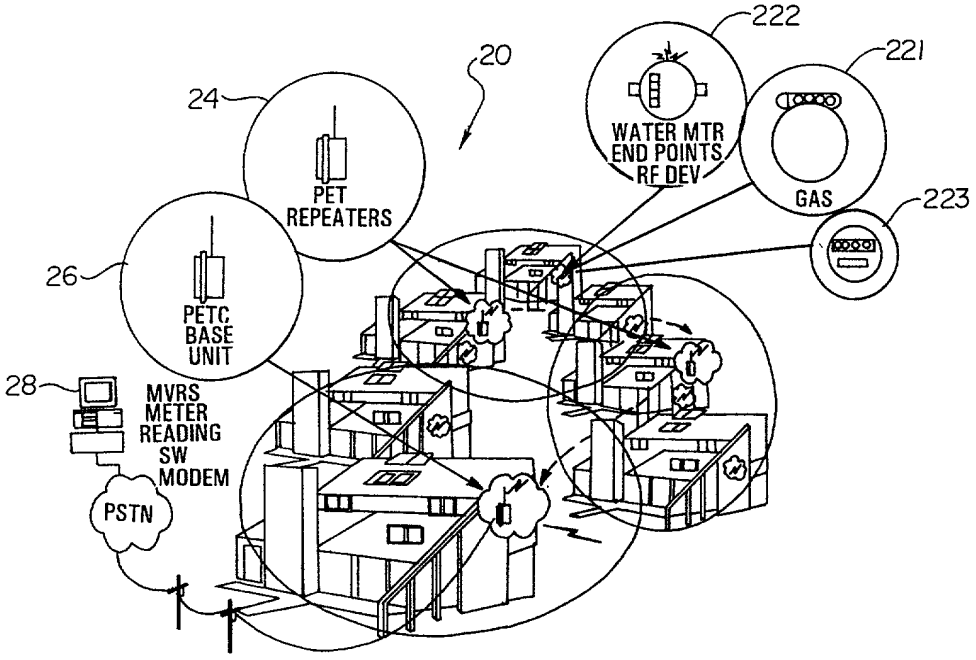
Fig. 1


20
24
PET
REPEATERS
26
PETC
BASE
UNIT
28
MVRS
METER
READING
SW
MODEM
PSTN
222
WATER MTR
END POINTS
RF DEV
221
GAS
223

20STTO" 0h8TT660

Fig.2

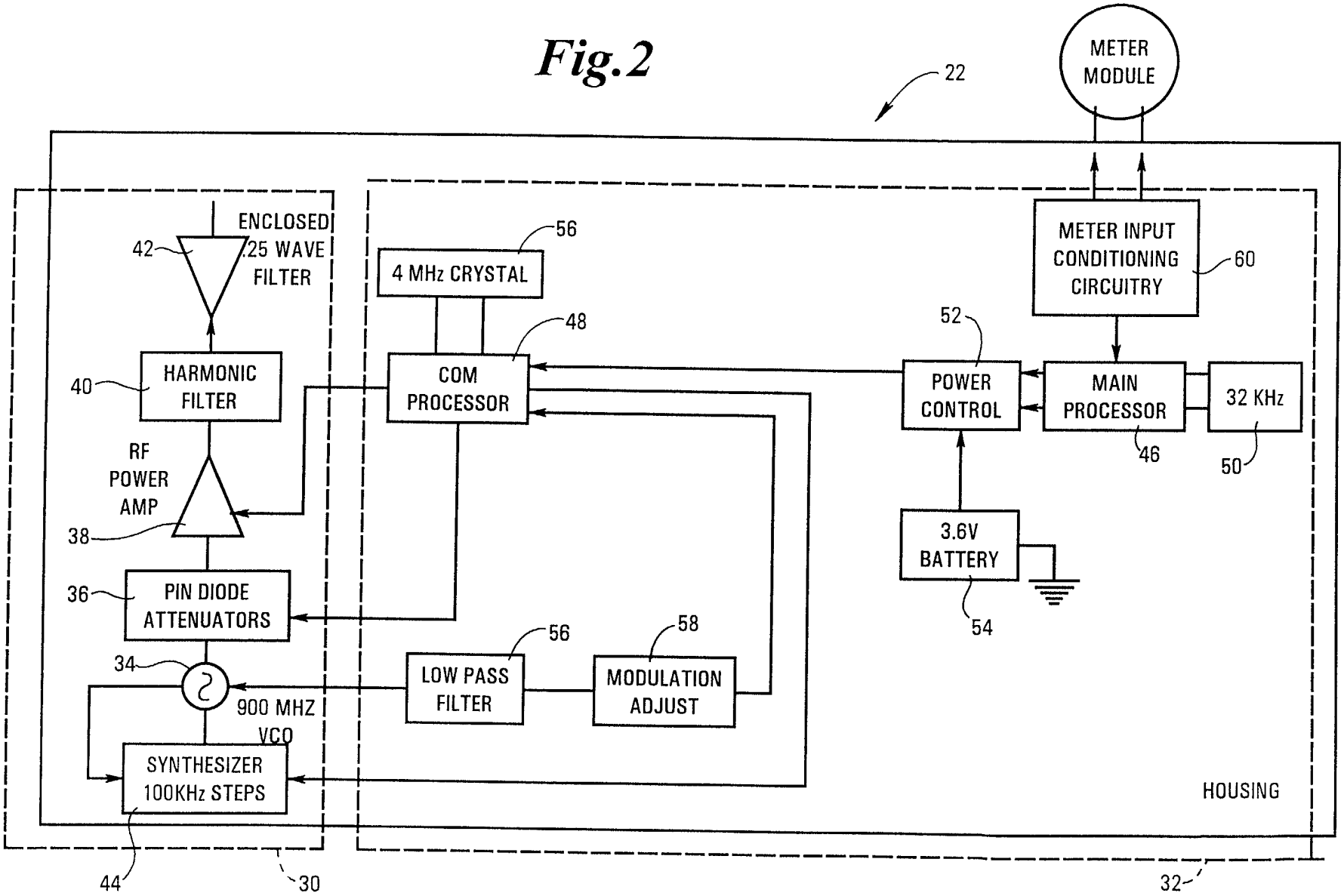


Fig.3

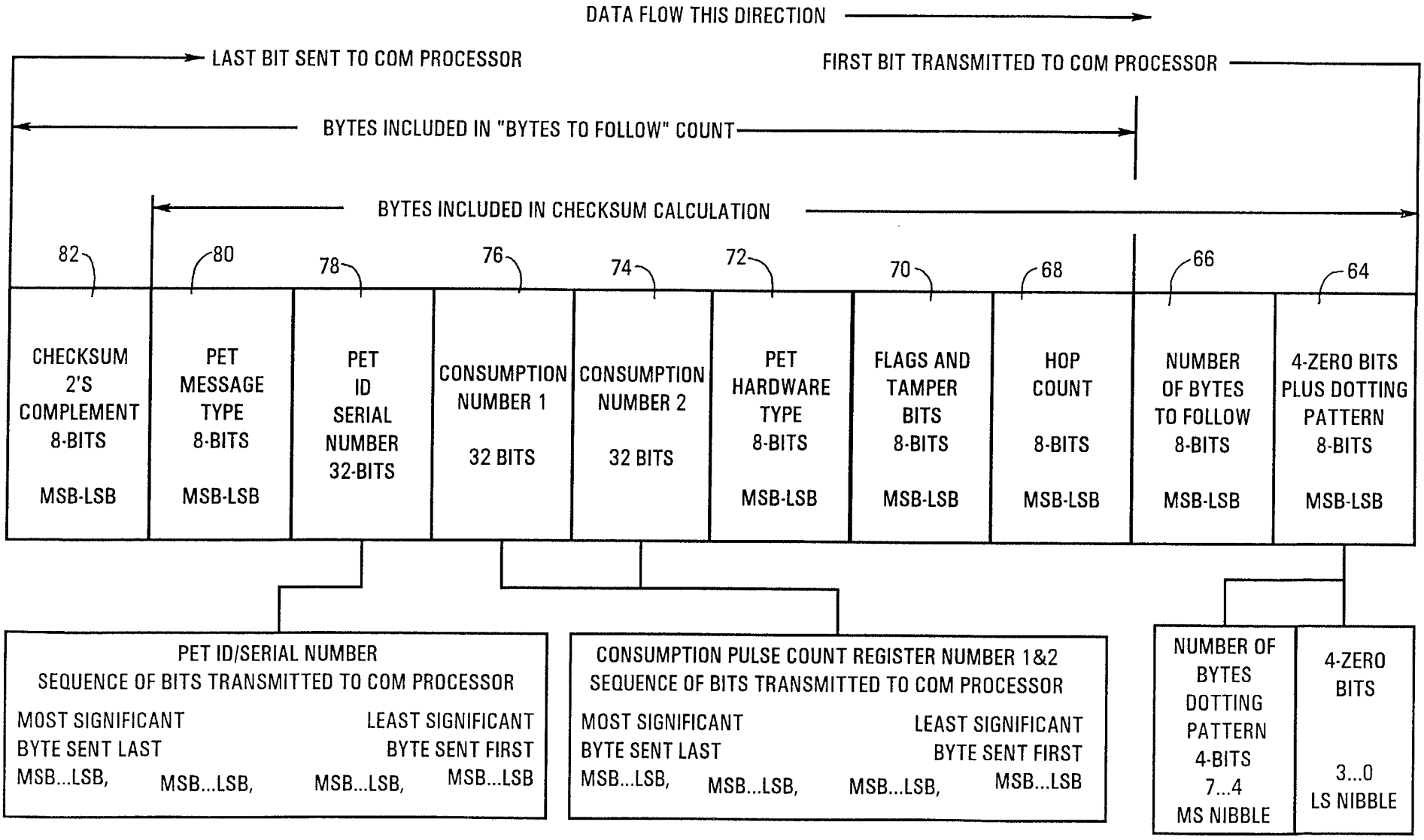
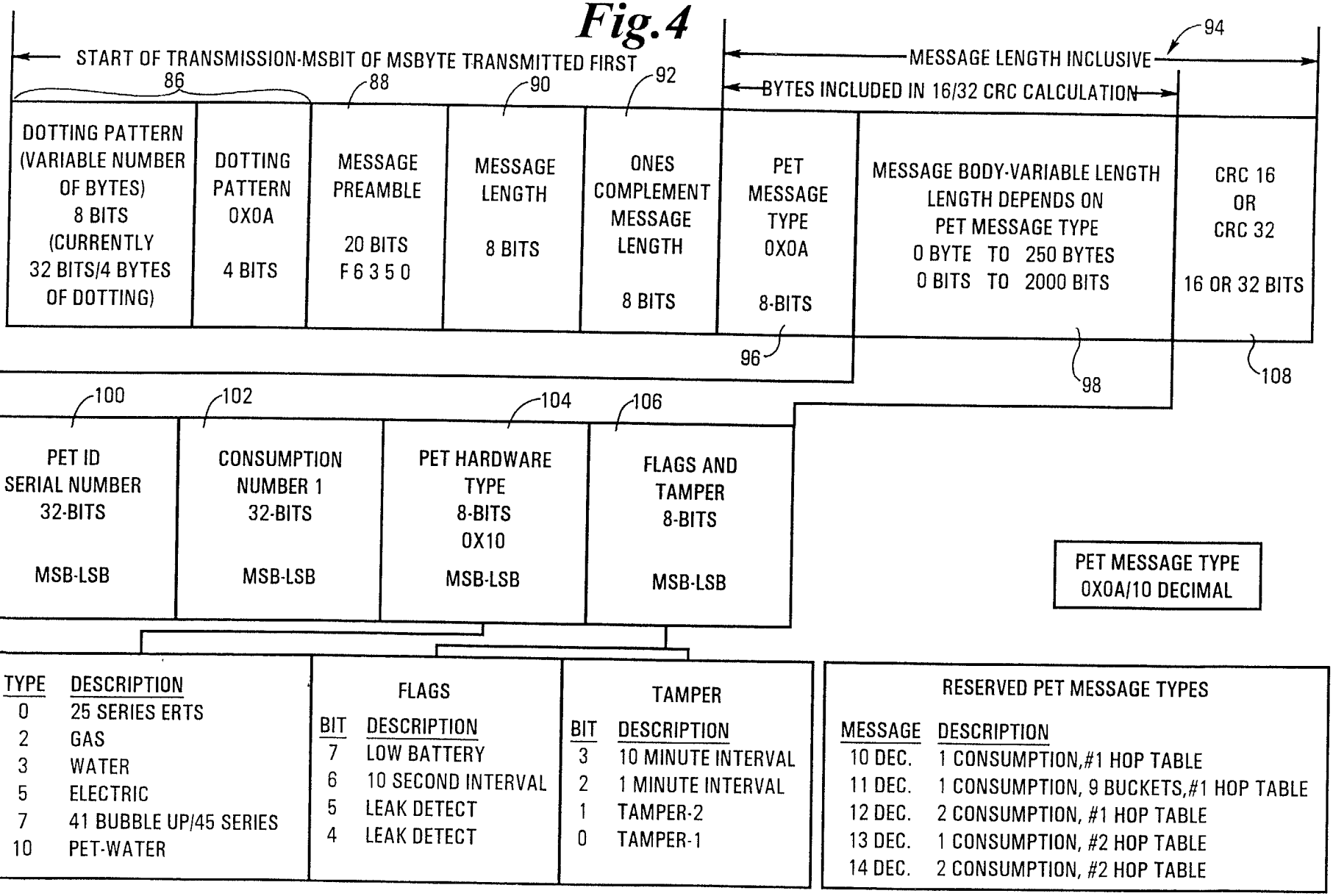

DATA FLOW THIS DIRECTION
LAST BIT SENT TO COM PROCESSOR
FIRST BIT TRANSMITTED TO COM PROCESSOR
BYTES INCLUDED IN "BYTES TO FOLLOW" COUNT
BYTES INCLUDED IN CHECKSUM CALCULATION
82
80
78
76
74
72
70
68
66
64
CHECKSUM 2'S COMPLEMENT 8-BITS MSB-LSB
PET MESSAGE TYPE 8-BITS MSB-LSB
PET ID SERIAL NUMBER 32-BITS
CONSUMPTION NUMBER 1 32 BITS
CONSUMPTION NUMBER 2 32 BITS
PET HARDWARE TYPE 8-BITS MSB-LSB
FLAGS AND TAMPER BITS 8-BITS MSB-LSB
HOP COUNT 8-BITS MSB-LSB
NUMBER OF BYTES TO FOLLOW 8-BITS MSB-LSB
4-ZERO BITS PLUS DOTTING PATTERN 8-BITS MSB-LSB
PET ID/SERIAL NUMBER
SEQUENCE OF BITS TRANSMITTED TO COM PROCESSOR
MOST SIGNIFICANT BYTE SENT LAST
LEAST SIGNIFICANT BYTE SENT FIRST
MSB...LSB, MSB...LSB, MSB...LSB, MSB...LSB
CONSUMPTION PULSE COUNT REGISTER NUMBER 1&2
SEQUENCE OF BITS TRANSMITTED TO COM PROCESSOR
MOST SIGNIFICANT BYTE SENT LAST
LEAST SIGNIFICANT BYTE SENT FIRST
MSB...LSB, MSB...LSB, MSB...LSB, MSB...LSB
NUMBER OF BYTES DOTTING PATTERN 4-BITS 7...4 MS NIBBLE
4-ZERO BITS 3...0 LS NIBBLE

Fig. 4



TYPE	DESCRIPTION
0	25 SERIES ERTS
2	GAS
3	WATER
5	ELECTRIC
7	41 BUBBLE UP/45 SERIES
10	PET-WATER

FLAGS

BIT	DESCRIPTION
7	LOW BATTERY
6	10 SECOND INTERVAL
5	LEAK DETECT
4	LEAK DETECT

TAMPER

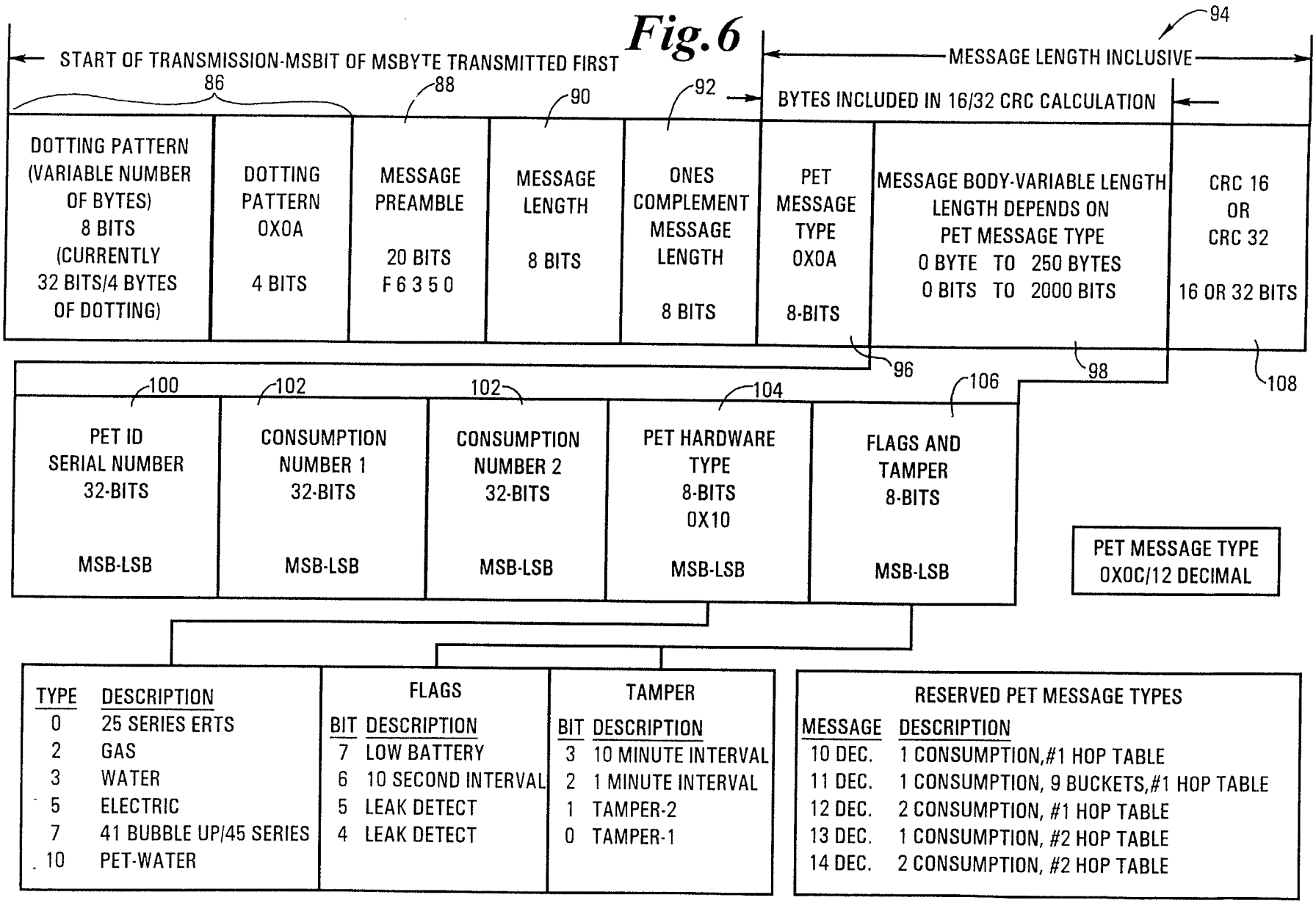
BIT	DESCRIPTION
3	10 MINUTE INTERVAL
2	1 MINUTE INTERVAL
1	TAMPER-2
0	TAMPER-1

RESERVED PET MESSAGE TYPES

MESSAGE	DESCRIPTION
10 DEC.	1 CONSUMPTION,#1 HOP TABLE
11 DEC.	1 CONSUMPTION, 9 BUCKETS,#1 HOP TABLE
12 DEC.	2 CONSUMPTION, #1 HOP TABLE
13 DEC.	1 CONSUMPTION, #2 HOP TABLE
14 DEC.	2 CONSUMPTION, #2 HOP TABLE

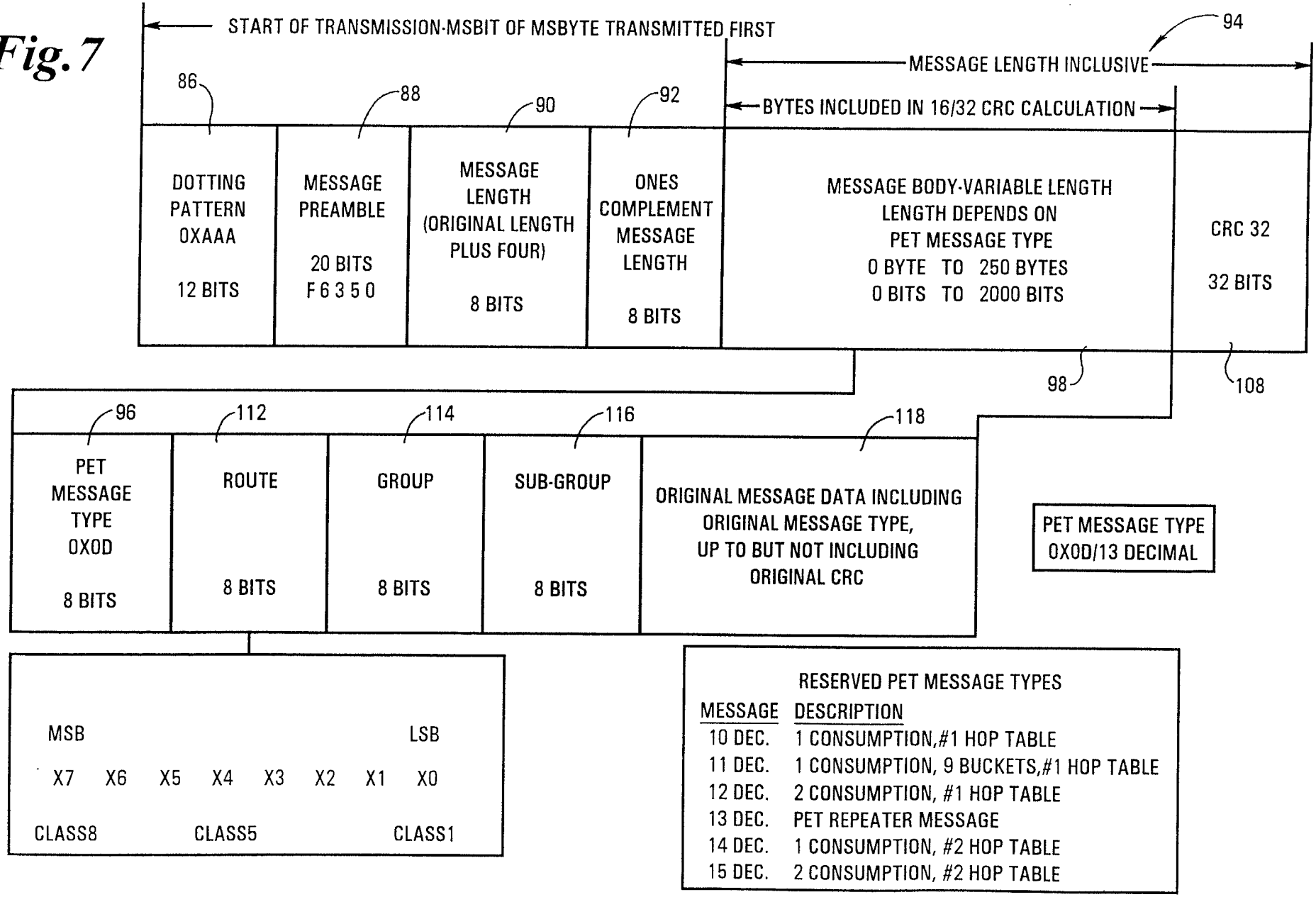
20570 "Oct1660

Fig. 6



20577D "0485660

Fig. 7

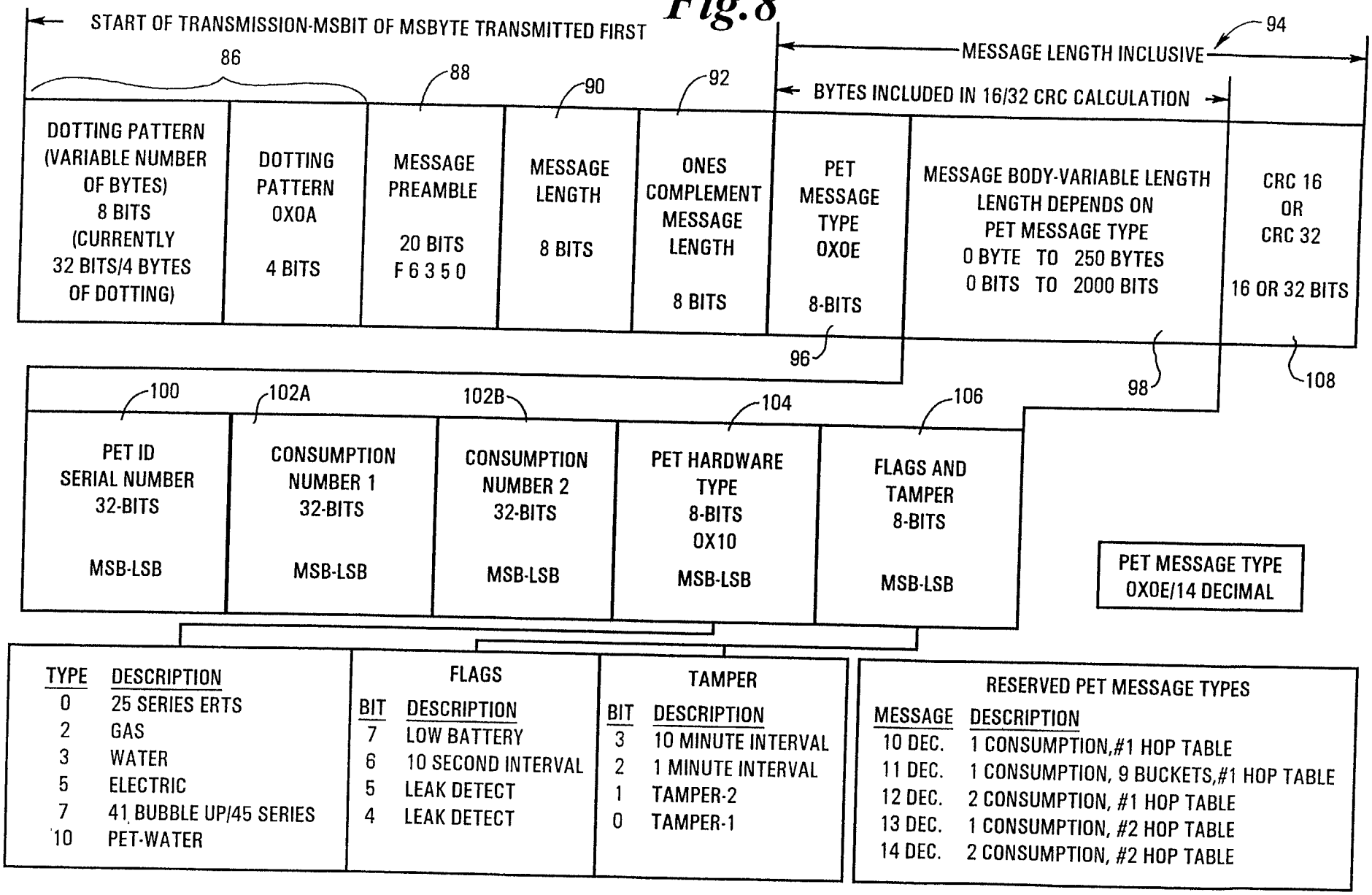


RESERVED PET MESSAGE TYPES

MESSAGE	DESCRIPTION
10 DEC.	1 CONSUMPTION,#1 HOP TABLE
11 DEC.	1 CONSUMPTION, 9 BUCKETS,#1 HOP TABLE
12 DEC.	2 CONSUMPTION, #1 HOP TABLE
13 DEC.	PET REPEATER MESSAGE
14 DEC.	1 CONSUMPTION, #2 HOP TABLE
15 DEC.	2 CONSUMPTION, #2 HOP TABLE

2051T0" 0n9TT660

Fig. 8



TYPE	DESCRIPTION
0	25 SERIES ERTS
2	GAS
3	WATER
5	ELECTRIC
7	41 BUBBLE UP/45 SERIES
10	PET-WATER

FLAGS

BIT	DESCRIPTION
7	LOW BATTERY
6	10 SECOND INTERVAL
5	LEAK DETECT
4	LEAK DETECT

TAMPER

BIT	DESCRIPTION
3	10 MINUTE INTERVAL
2	1 MINUTE INTERVAL
1	TAMPER-2
0	TAMPER-1

RESERVED PET MESSAGE TYPES

MESSAGE	DESCRIPTION
10 DEC.	1 CONSUMPTION,#1 HOP TABLE
11 DEC.	1 CONSUMPTION, 9 BUCKETS,#1 HOP TABLE
12 DEC.	2 CONSUMPTION, #1 HOP TABLE
13 DEC.	1 CONSUMPTION, #2 HOP TABLE
14 DEC.	2 CONSUMPTION, #2 HOP TABLE

20STED" 04BTT6D

Fig.9

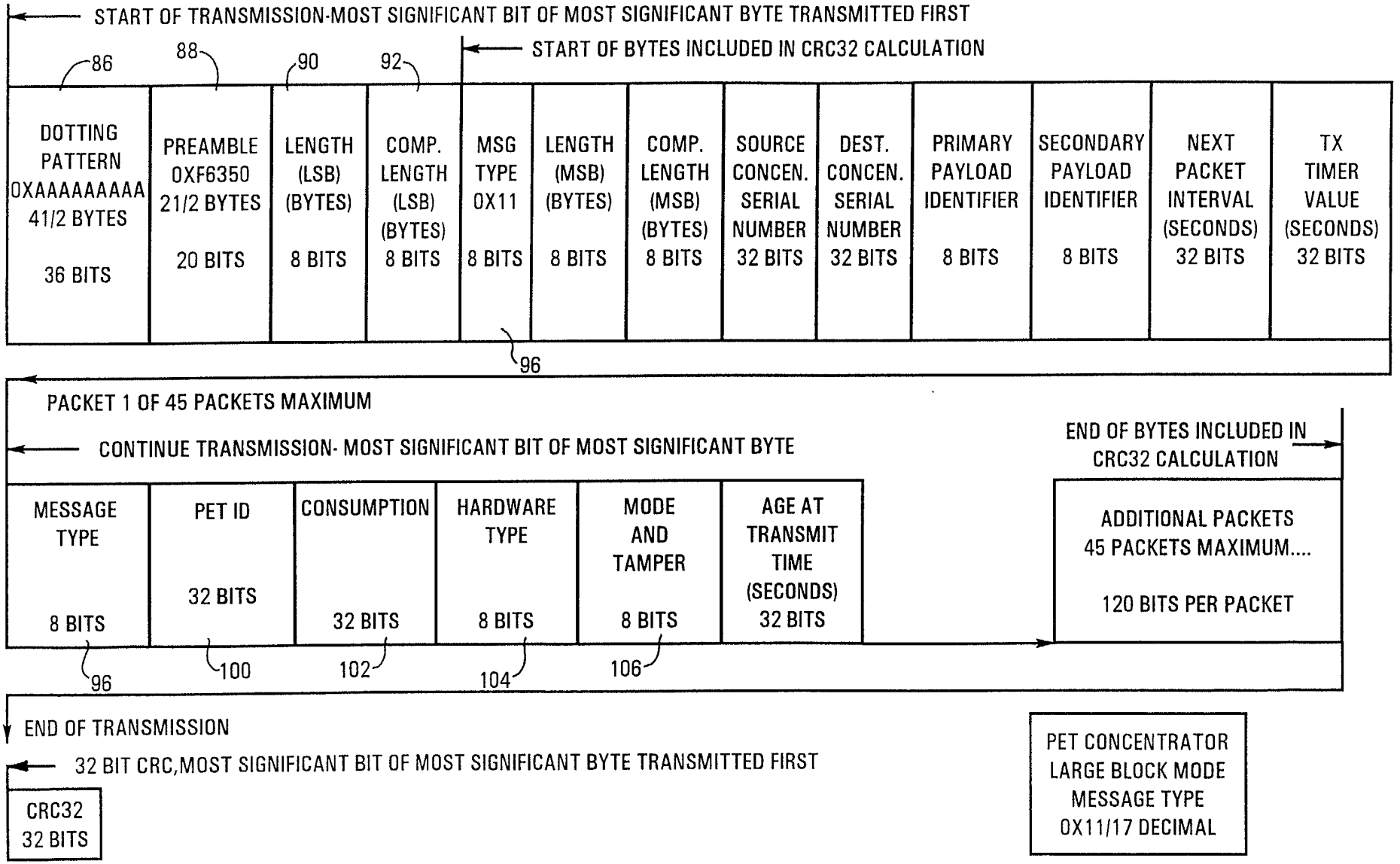
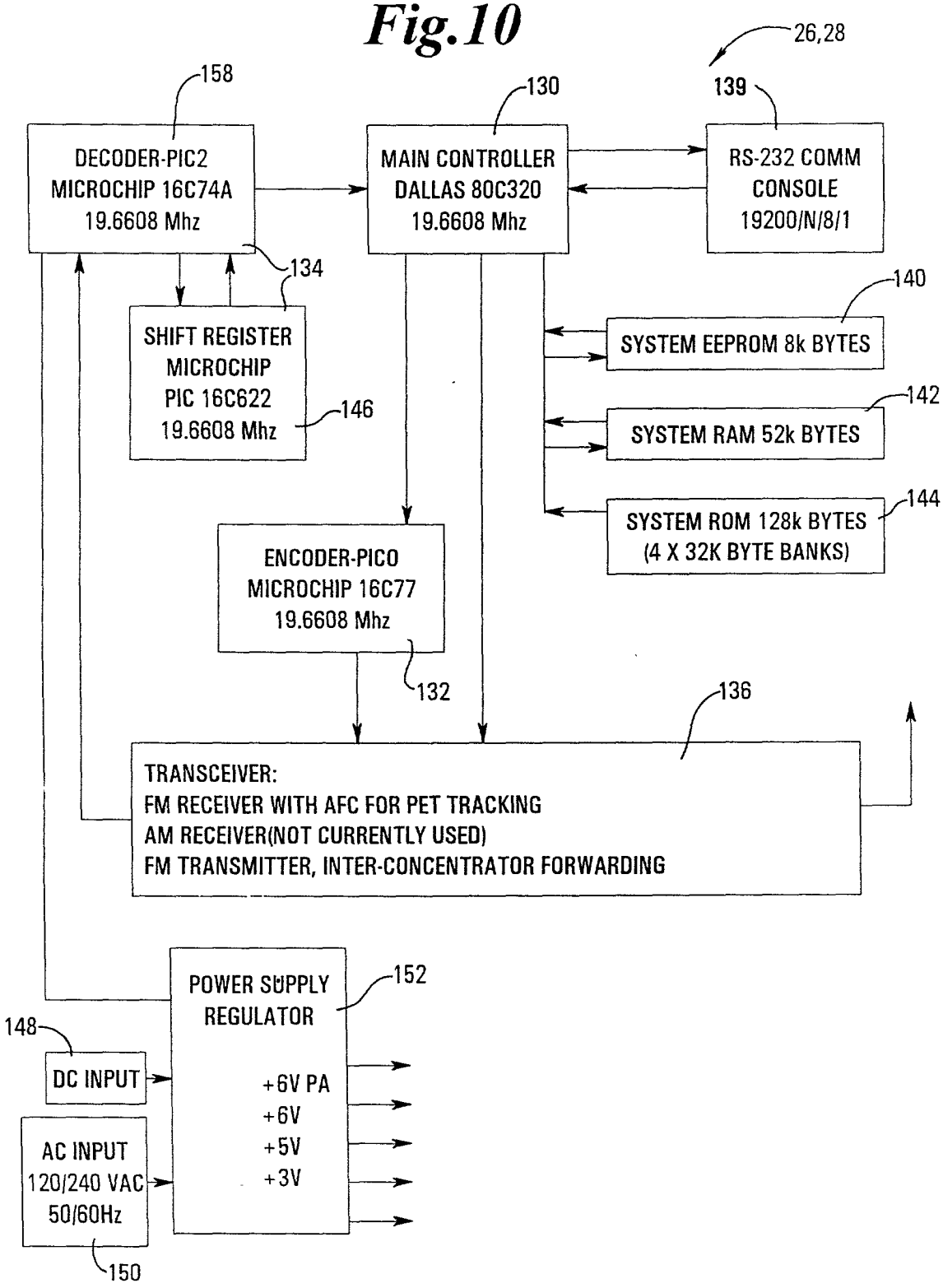


Fig.10


26,28
158
130
139
DECODER-PIC2
MICROCHIP 16C74A
19.6608 Mhz
MAIN CONTROLLER
DALLAS 80C320
19.6608 Mhz
RS-232 COMM
CONSOLE
19200/N/8/1
134
140
SHIFT REGISTER
MICROCHIP
PIC 16C622
19.6608 Mhz
146
SYSTEM EEPROM 8k BYTES
142
SYSTEM RAM 52k BYTES
144
SYSTEM ROM 128k BYTES
(4 X 32K BYTE BANKS)
ENCODER-PICO
MICROCHIP 16C77
19.6608 Mhz
132
136
TRANSCEIVER:
FM RECEIVER WITH AFC FOR PET TRACKING
AM RECEIVER(NOT CURRENTLY USED)
FM TRANSMITTER, INTER-CONCENTRATOR FORWARDING
POWER SUPPLY
REGULATOR
152
148
DC INPUT
+6V PA
+6V
+5V
+3V
AC INPUT
120/240 VAC
50/60Hz
150

Doc 1 of 1

Fig. 11

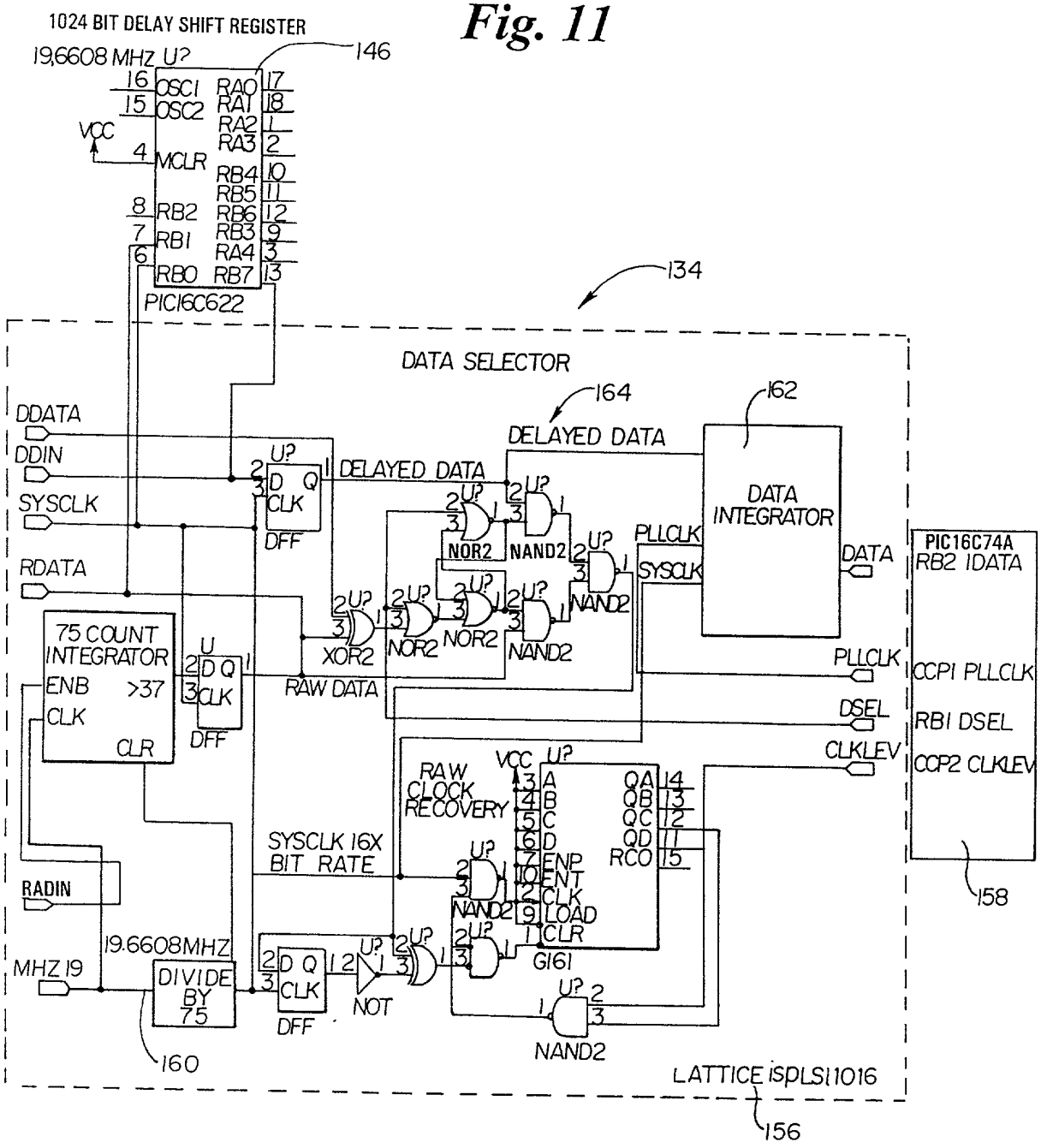
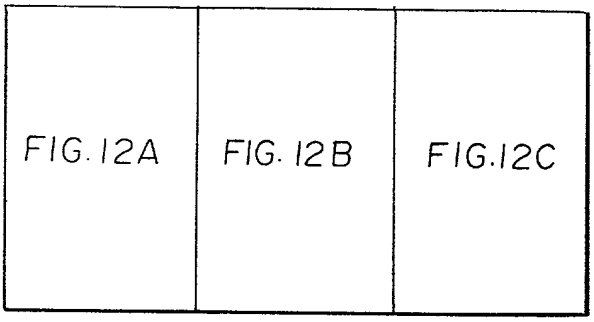


Fig. 12



US 6,954,580 B2

Fig.12A

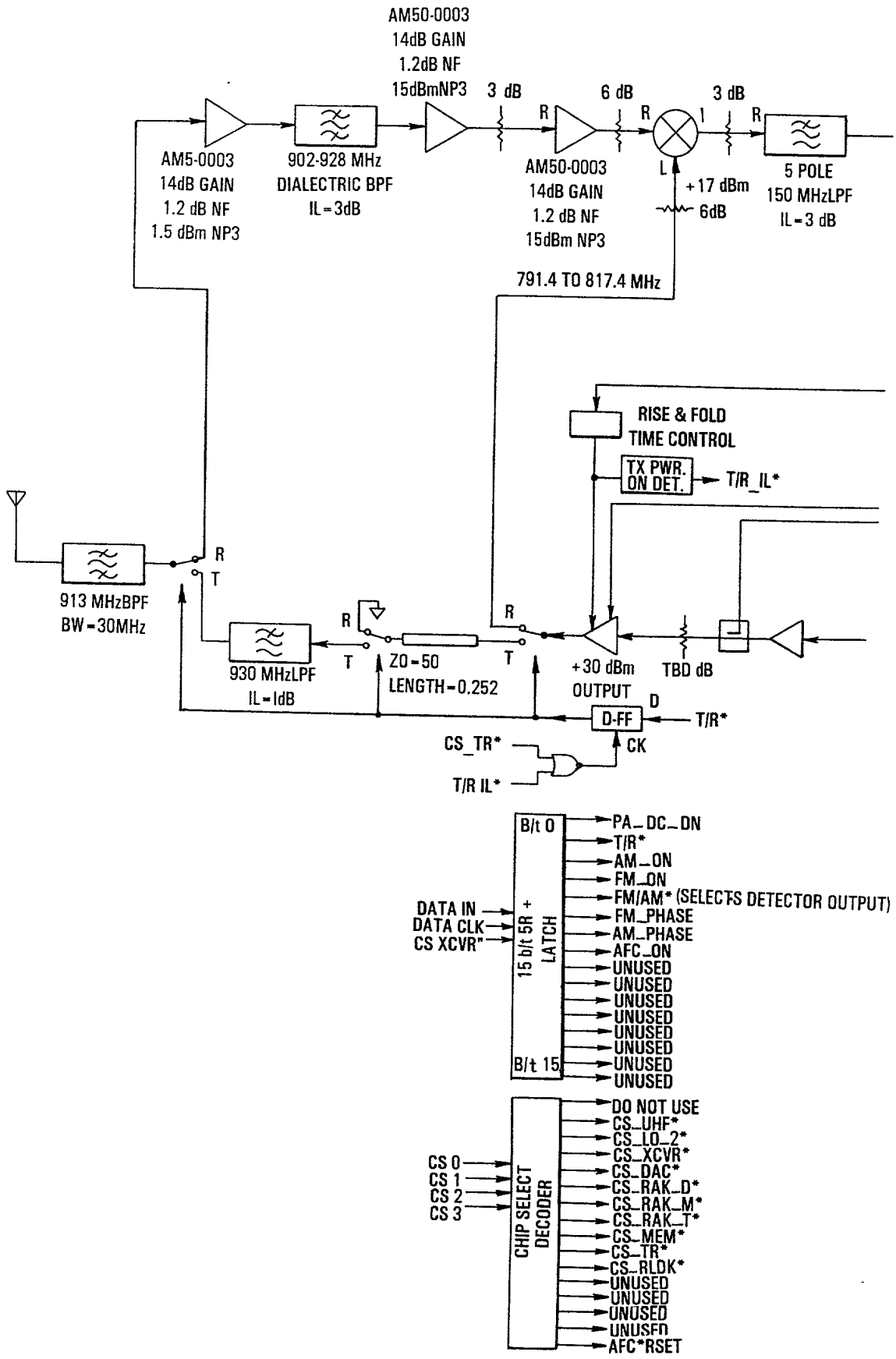
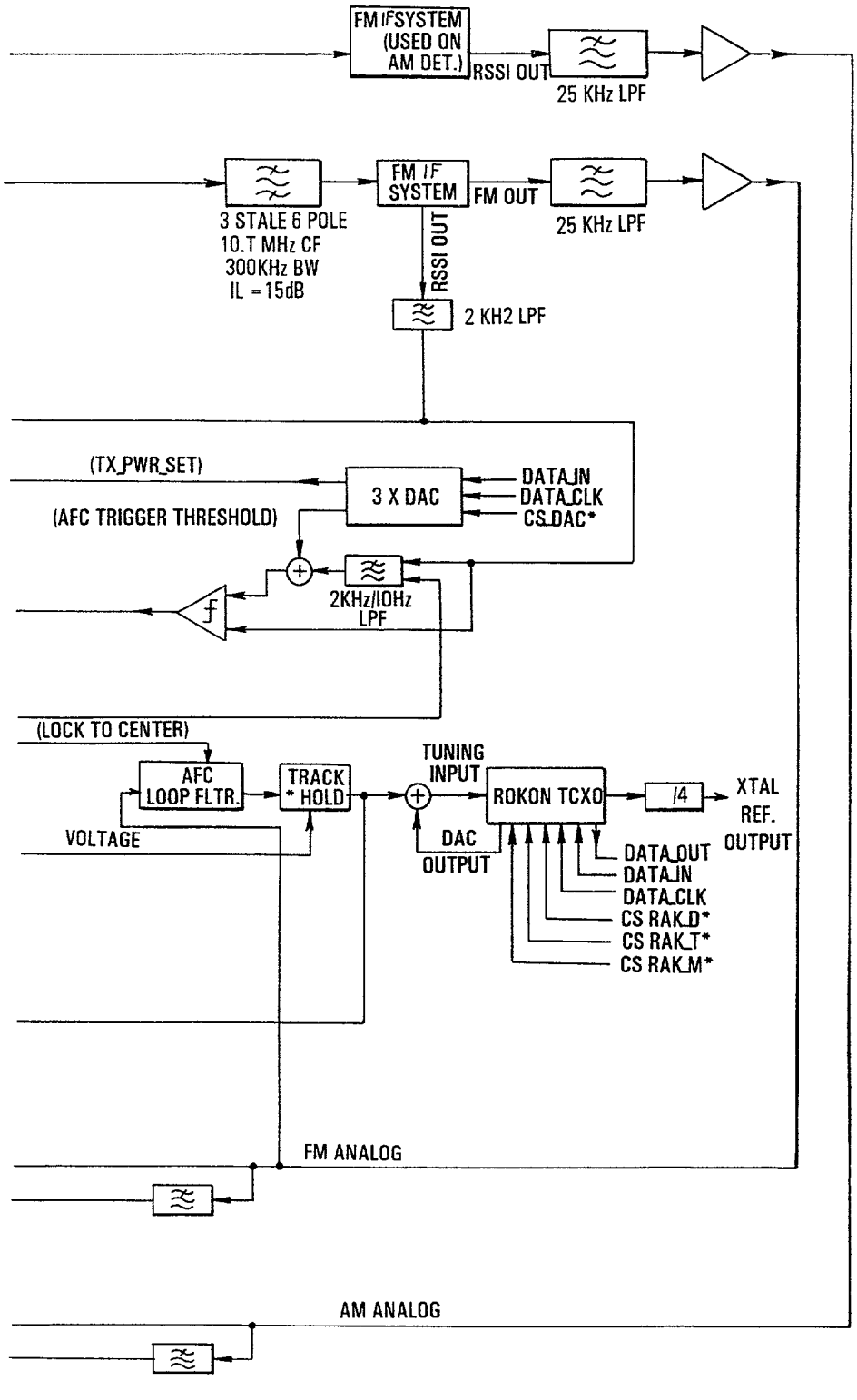
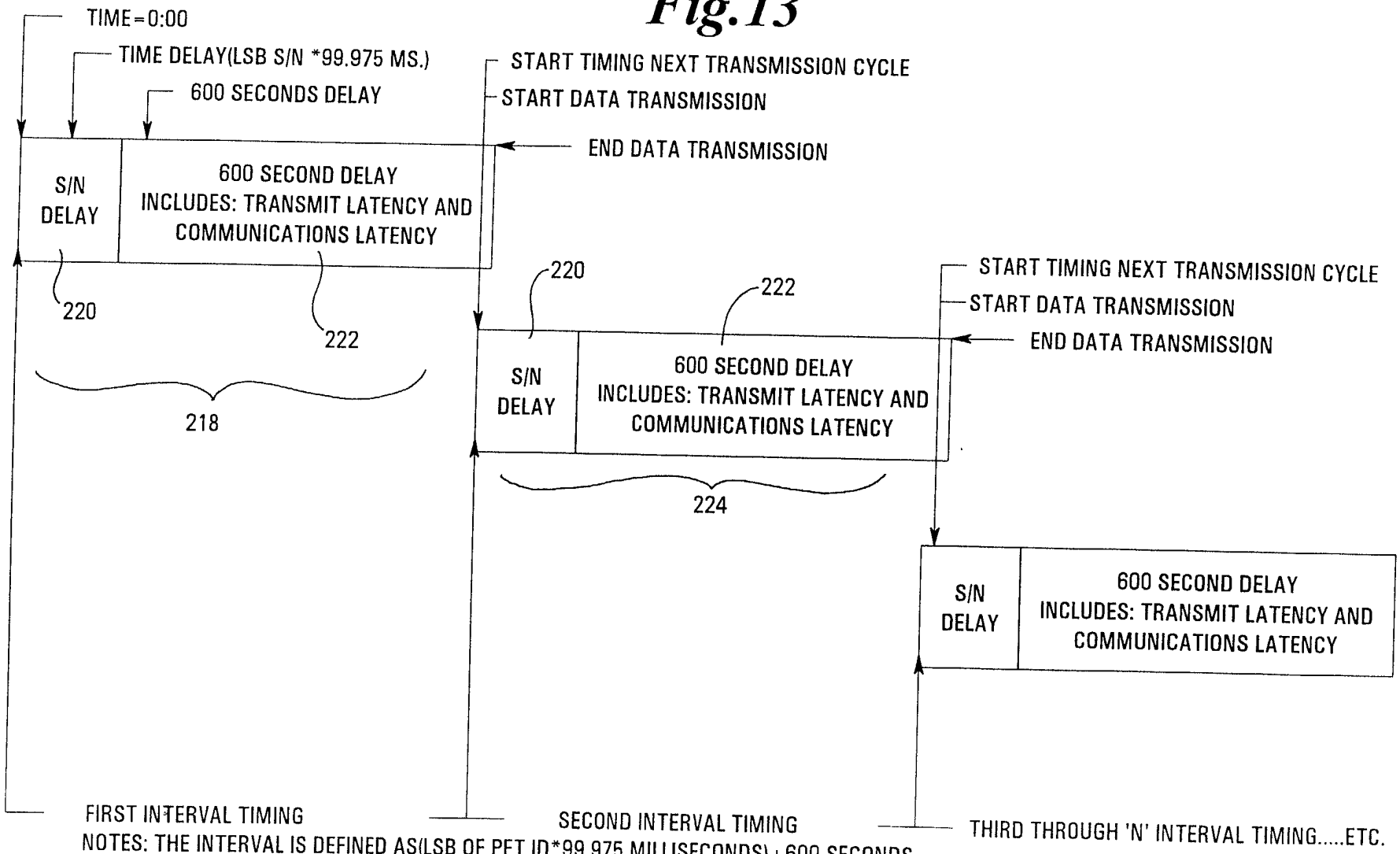

AM50-0003
14dB GAIN
1.2dB NF
15dBmNP3
3 dB
6 dB
3 dB
R
R
I
R
AM5-0003
14dB GAIN
1.2 dB NF
1.5 dBm NP3
902-928 MHz
DIALECTRIC BPF
IL=3dB
AM50-0003
14dB GAIN
1.2 dB NF
15dBm NP3
L
+17 dBm
6dB
5 POLE
150 MHzLPF
IL=3 dB
791.4 TO 817.4 MHz
RISE & FOLD
TIME CONTROL
TX PWR.
ON DET.
T/R_IL*
R
T
913 MHzBPF
BW=30MHz
R
T
930 MHzLPF
IL=1dB
R
T
Z0=50
LENGTH=0.252
R
+30 dBm
OUTPUT
TBD dB
D
D-FF
T/R*
CK
CS_TR*
T/R IL*
B/t 0
B/t 15
15 b/t 5R + LATCH
DATA IN
DATA CLK
CS XCVR*
PA_DC_DN
T/R*
AM_ON
FM_ON
FM/AM* (SELECTS DETECTOR OUTPUT)
FM_PHASE
AM_PHASE
AFC_ON
UNUSED
UNUSED
UNUSED
UNUSED
UNUSED
UNUSED
UNUSED
UNUSED
CHIP SELECT DECODER
CS 0
CS 1
CS 2
CS 3
DO NOT USE
CS_UHF*
CS_LO_2*
CS_XCVR*
CS_DAC*
CS_RAK_D*
CS_RAK_M*
CS_RAK_T*
CS_MEM*
CS_TR*
CS_RLDK*
UNUSED
UNUSED
UNUSED
UNUSED
UNUSED
AFC*RSET

Fig.12C


FM IF SYSTEM (USED ON AM DET.)
RSSI OUT
25 KHz LPF
3 STALE 6 POLE
10.T MHz CF
300KHz BW
IL = 15dB
FM IF SYSTEM
FM OUT
25 KHz LPF
RSSI OUT
2 KH2 LPF
(TX_PWR_SET)
(AFC TRIGGER THRESHOLD)
3 X DAC
DATA_IN
DATA_CLK
CS_DAC*
2KHz/IOHz LPF
(LOCK TO CENTER)
AFC LOOP FLTR.
TRACK * HOLD
TUNING INPUT
ROKON TCXO
/4
XTAL REF. OUTPUT
VOLTAGE
DAC OUTPUT
DATA_OUT
DATA_IN
DATA_CLK
CS RAK_D*
CS RAK_T*
CS RAK_M*
FM ANALOG
AM ANALOG

3957E0 04ST660

Fig.13



NOTES: THE INTERVAL IS DEFINED AS(LSB OF PET ID*99.975 MILLISECONDS)+600 SECONDS.
THE ACTUAL TRANSMISSION WILL BEGIN AT THE END OF THE INTERVAL TIMING.
THE INTERVAL+1 TIMING WILL BEGIN IMMEDIATELY AT THE END OF THE CURRENT INTERVAL.
INITIAL TIMING FOR THE INTERVAL+1 WILL OVERLAP ACTUAL'TRANSMIT' TIME OF THE CURRENT INTERVAL.

20STTD" 0ASTT66D

PET RECEIVER MINIMUM WINDOW

NOTE: THE WINDOW REQUIRED IS 380 MILLISECONDS(200ms EARLY PLUS 180ms LATE) THIS REPRESENT THE MINIMUM TIME NECESSARY TO COMPENSATE FOR CRYSTAL TOLERANCES AND PREAMBLE DETECT.
200 MILLISECONDS REPRESENTS 180 MILLISECONDS EARLY PLUS 20 MILLISECONDS ALLOWED FOR PREAMBLE DETECT TO OCCUR.
THE INTERVAL IS MAINTAINED AND REPRESENTS THE TIME FROM ONE PREAMBLE DETECT TO THE NEXT PREAMBLE DETECT.

Fig.14

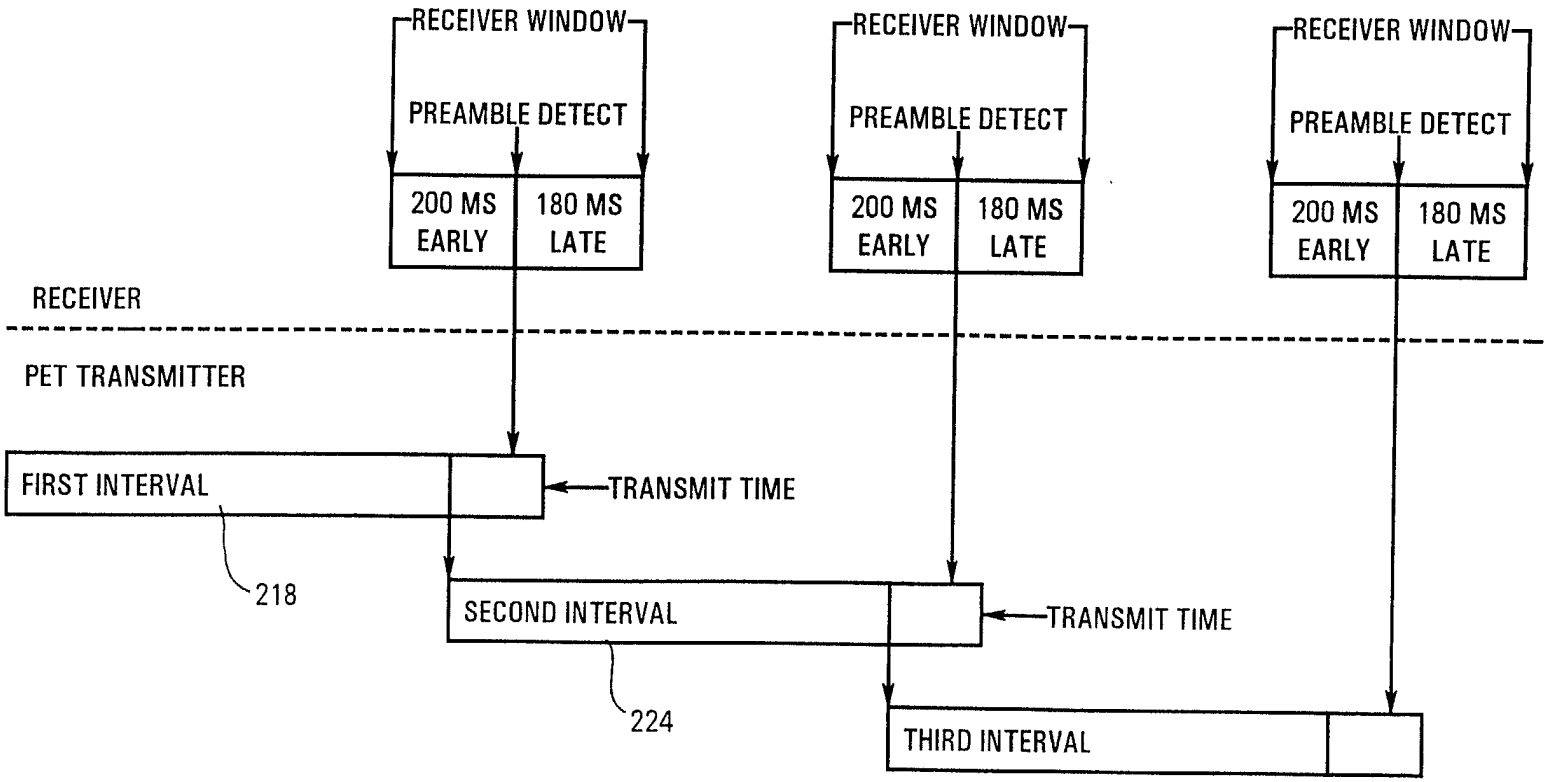
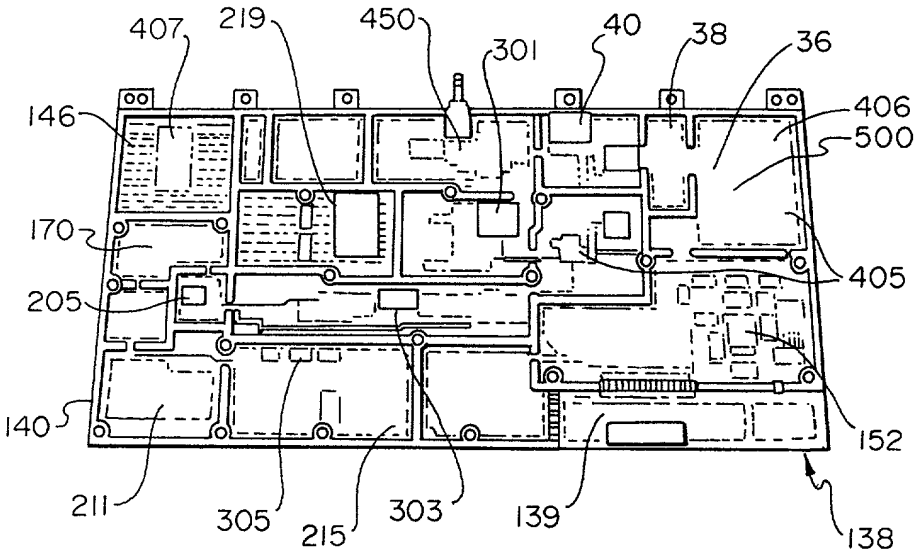


Fig. 15


407
219
450
301
40
38
36
146
406
500
170
405
205
140
152
211
305
215
303
139
138

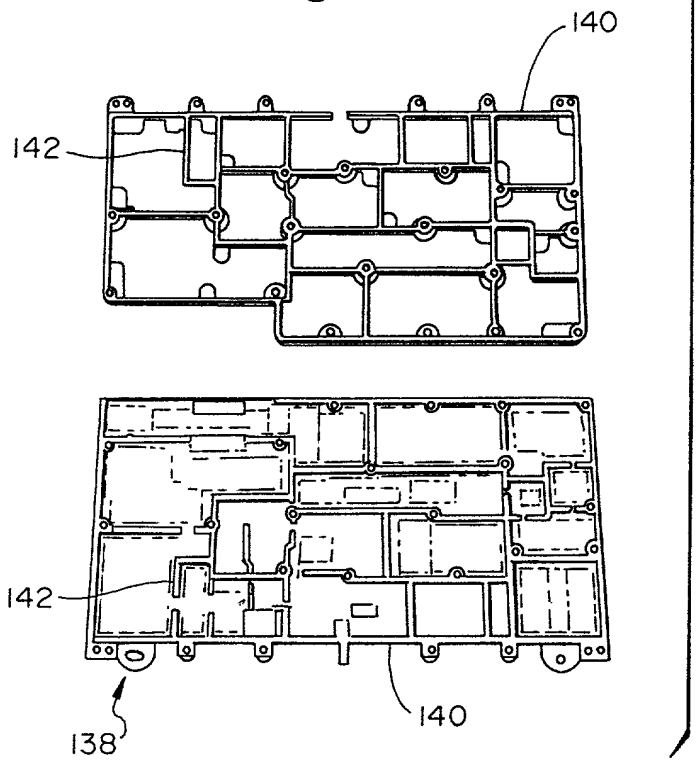



Fig. 16